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(54) Title: OPTICAL COUPLER DEVICES, METHODS OF THEIR PRODUCTION AND USE

(57) **Abstract:** The present invention relates in general to coupling of light from one or more input waveguides to an output waveguide or output section of a waveguide having other physical dimensions and/or optical properties than the input waveguide or waveguides. The invention relates to an optical component in the form of a photonic crystal fibre for coupling light from one component/system with a given numerical aperture to another component/system with another numerical aperture. The invention further relates to methods of producing the optical component, and articles comprising the optical component, and to the use of the optical component. The invention further relates to an optical component comprising a bundle of input fibres that are tapered and fused together to form an input coupler e.g. for coupling light from several light sources into a single waveguide. The invention still further relates to the control of the spatial extension of a guided mode (e.g. a mode-field diameter) of an optical beam in an optical fibre. The invention relates to a tapered longitudinally extending optical waveguide having a relatively larger crosssection that over a certain longitudinal distance is tapered down to a relatively smaller cross section wherein the spatial extent of the guided mode is substantially constant or expanding from the relatively larger to the relatively smaller waveguide cross section. The invention may e.g. be useful in applications such as fibre lasers or amplifiers, where light must be coupled efficiently from pump sources to a double clad fibre.

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